SSATP/World Bank Workshop, Accra, Ghana
27th – 29th September 2006

New Approaches to Sustainable Provision of Low-Volume Sealed Roads

Mike Pinard
SSATP/World Bank Consultant
(mipinard@global.bw)

Objective of Workshop

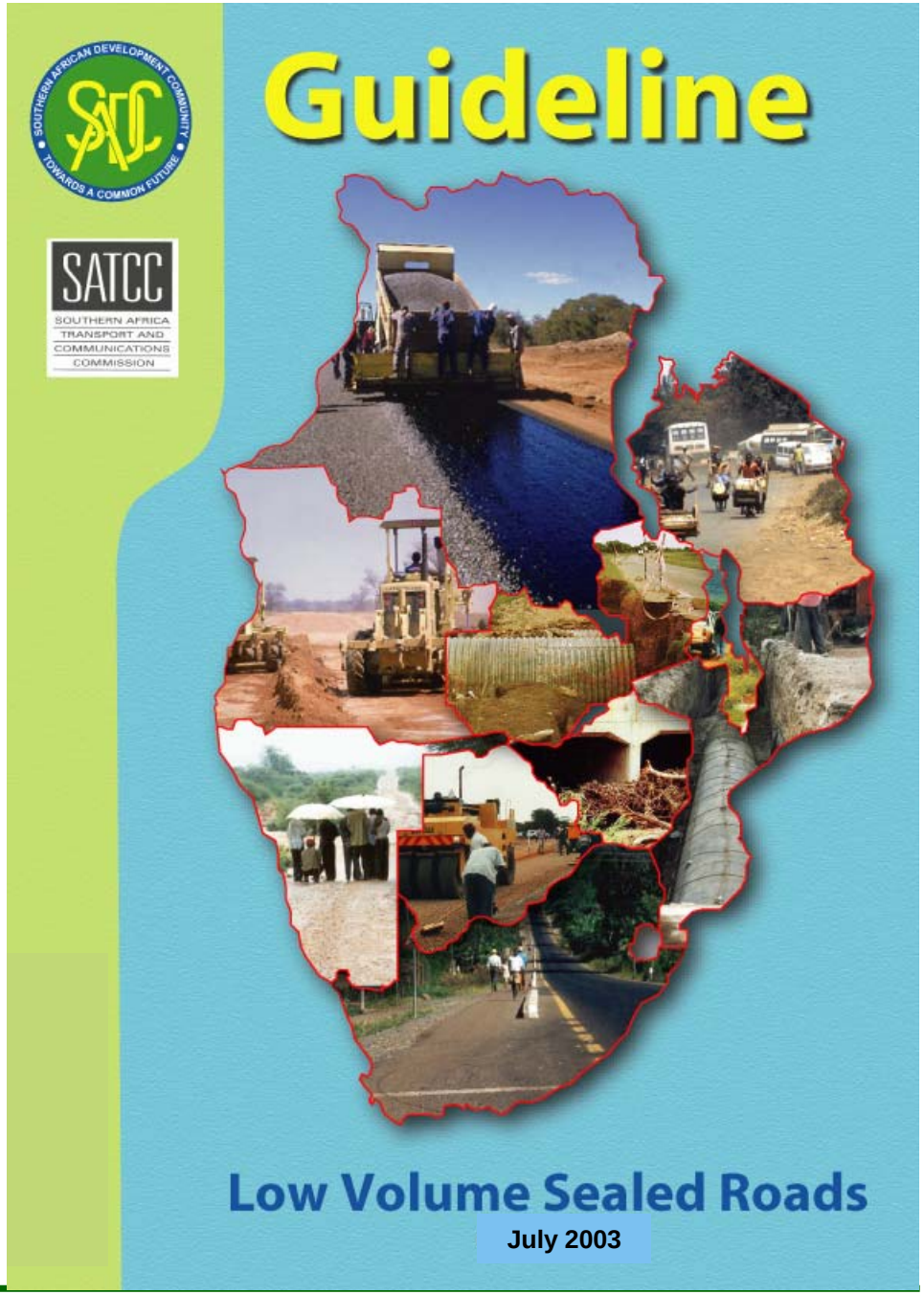
To share experiences with practitioners from Ghana, Nigeria and the Gambia with proven, alternative pavement and surfacing technologies that may offer significant benefits in their quest to provide low-volume sealed roads in a sustainable and more cost-effective manner than hitherto

Outline of Presentation

- Background to SADC guideline
- Why low-volume sealed roads
- New approaches and challenges

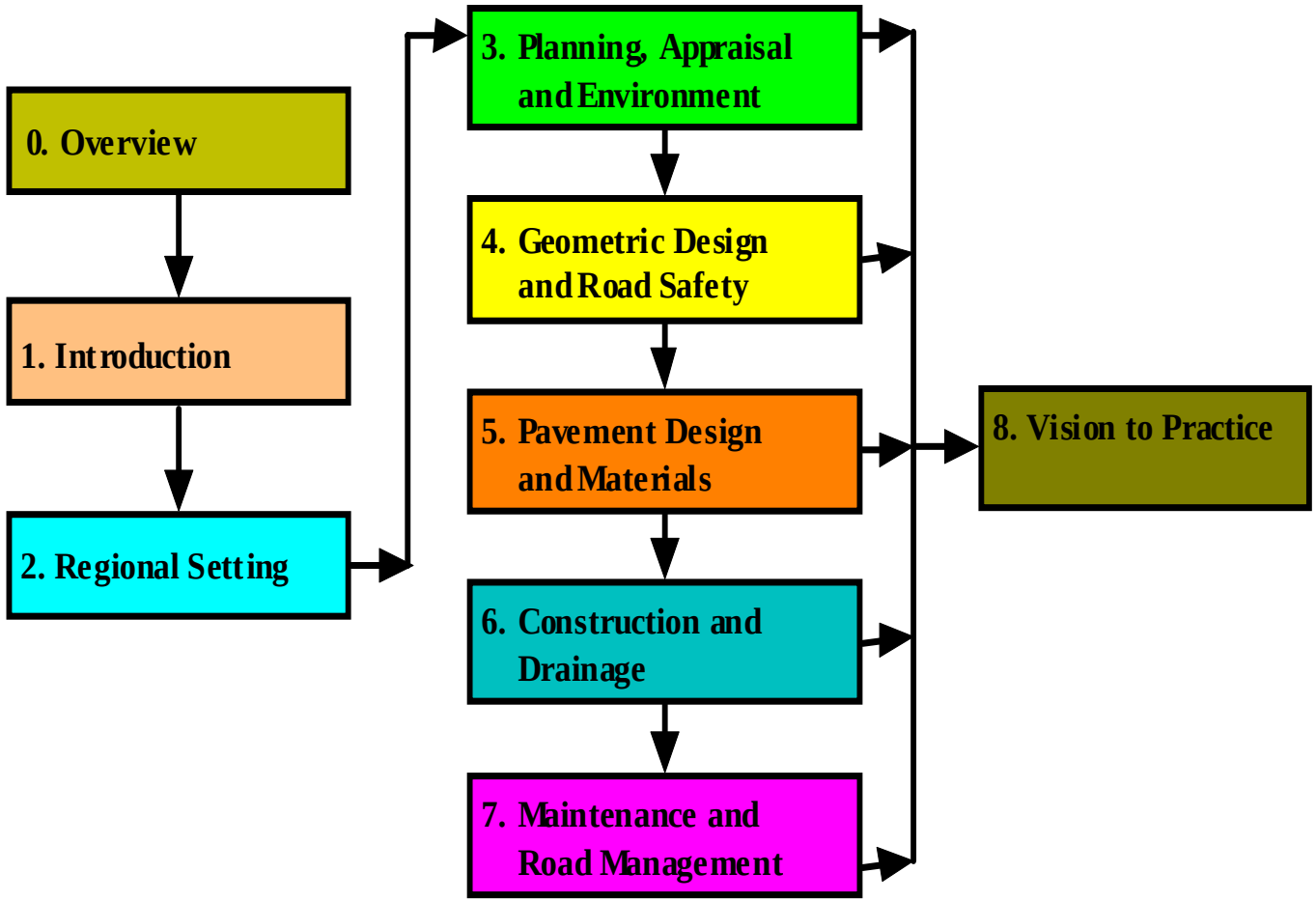
Background to workshop based on development of

The SADC Guideline on Low-Volume Sealed Roads



Introduction

Structure of Guideline



Contents of Guideline

- Introduction
- Regional setting
- Planning, appraisal and environment
- Geometric design and road safety
- Pavement design and materials
- Construction and drainage
- Maintenance and road management
- Vision to practice
- Summary/Way forward

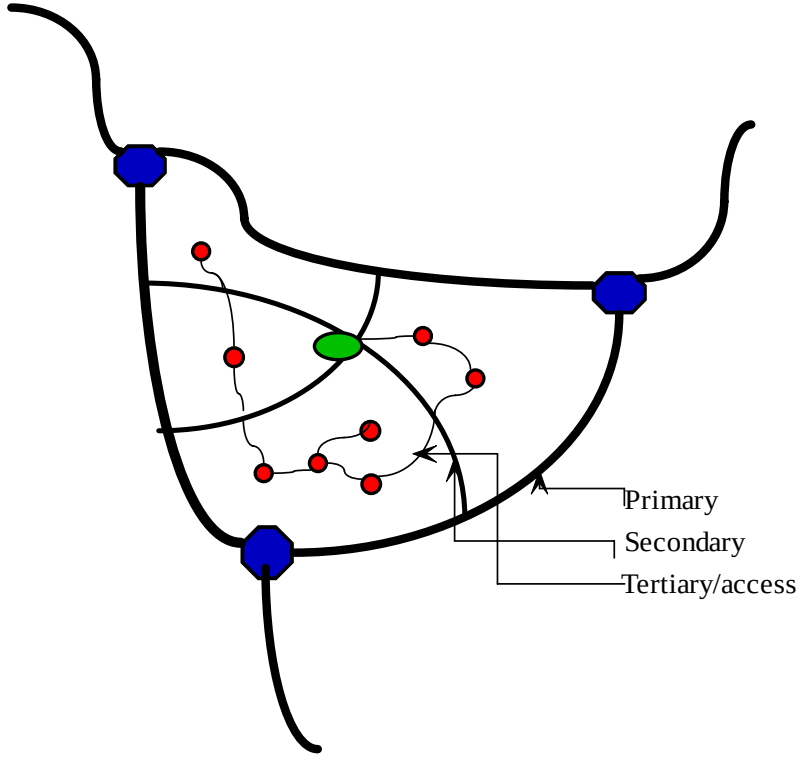
Introduction

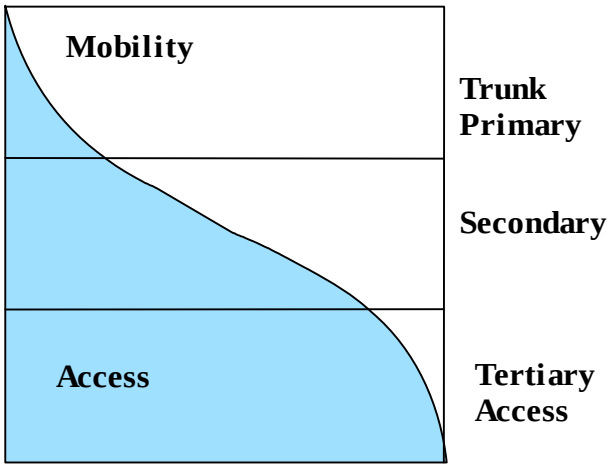
Definition of LVRs

- Many kinds of low volume roads serving different functions – may be primary, secondary or tertiary/access

- One characteristic in general – they all carry relatively low volumes of traffic – typically less than 200 vpd

- Guideline differentiates between different road functions but focuses on rural type roads which serve majority of population in SADC countries





Introduction

Importance of Low-Volume Roads

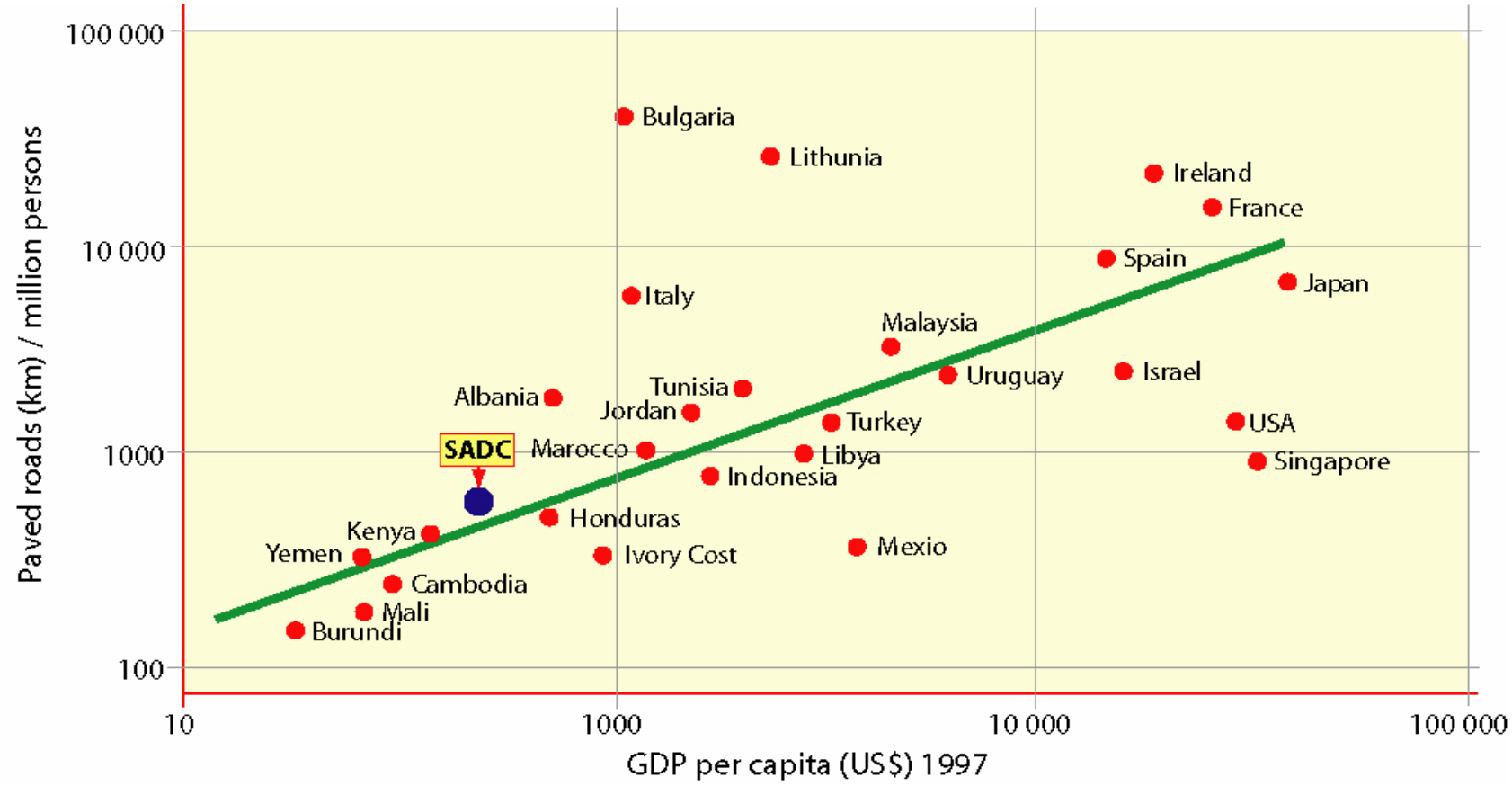
- Constitute a significant proportion of the road network in the SADC region for which funds are severely limited
- Impact significantly on the livelihoods of the majority of the population who live and work in rural areas
- Generally provide the only form of access to rural communities and provide for their mobility
- Essential for improving rural livelihoods and socio-economic growth and development and reducing poverty – over-arching goal of all SADC governments

Africa's road system compared to other regions/countries

Continent Country Region	Area	Pop	Total Road Network	Prim. + Sec. Roads	Tert. Roads	Of which paved	Road Density		Road Asset Value	Access
	1000 Sq km	m	1000 km	1000 km	1000 km	%	km/100 Square km	km/ 1000 pop	Billion US$	% of rural pop. without all season access
Africa	30019	865	2075	820	1215	30	6.8	2.3	210	30
SSA	24265	719	1839	698	1078	16	8.0	2.6	168	40
S. Africa	1219	46	534	233	301	34	43	11.6	84	20
USA	9159	291	6348	1394	4954	59	69	21.8	3770	1
India	3288	1064	3320	1496	1823	46	101	3.1	336	22

Introduction

Paved Roads and Economic Development



"You can always tell the state of a country's economy by looking at the state of its roads"

Introduction

Motivation for Guideline

- Traditional approaches to provision of LVSRs have stemmed from technology and research carried out over 40 years ago in very different environments
  - *not surprising that many of the imported approaches, designs and technologies are inappropriate for application in the region.*
- Technology, research and knowledge about LVSRs have advanced significantly in the region thro' research carried out over past 20 -30 years
  - *not only question much of the accepted wisdom on LVSR provision but also show quite clearly the need to revise conventional approaches.*
- Unfortunately, there has been little effective dissemination and uptake of the results of research carried out in the region
  - *triggered the need for this SADC Guideline on Low-Volume Sealed Roads*.

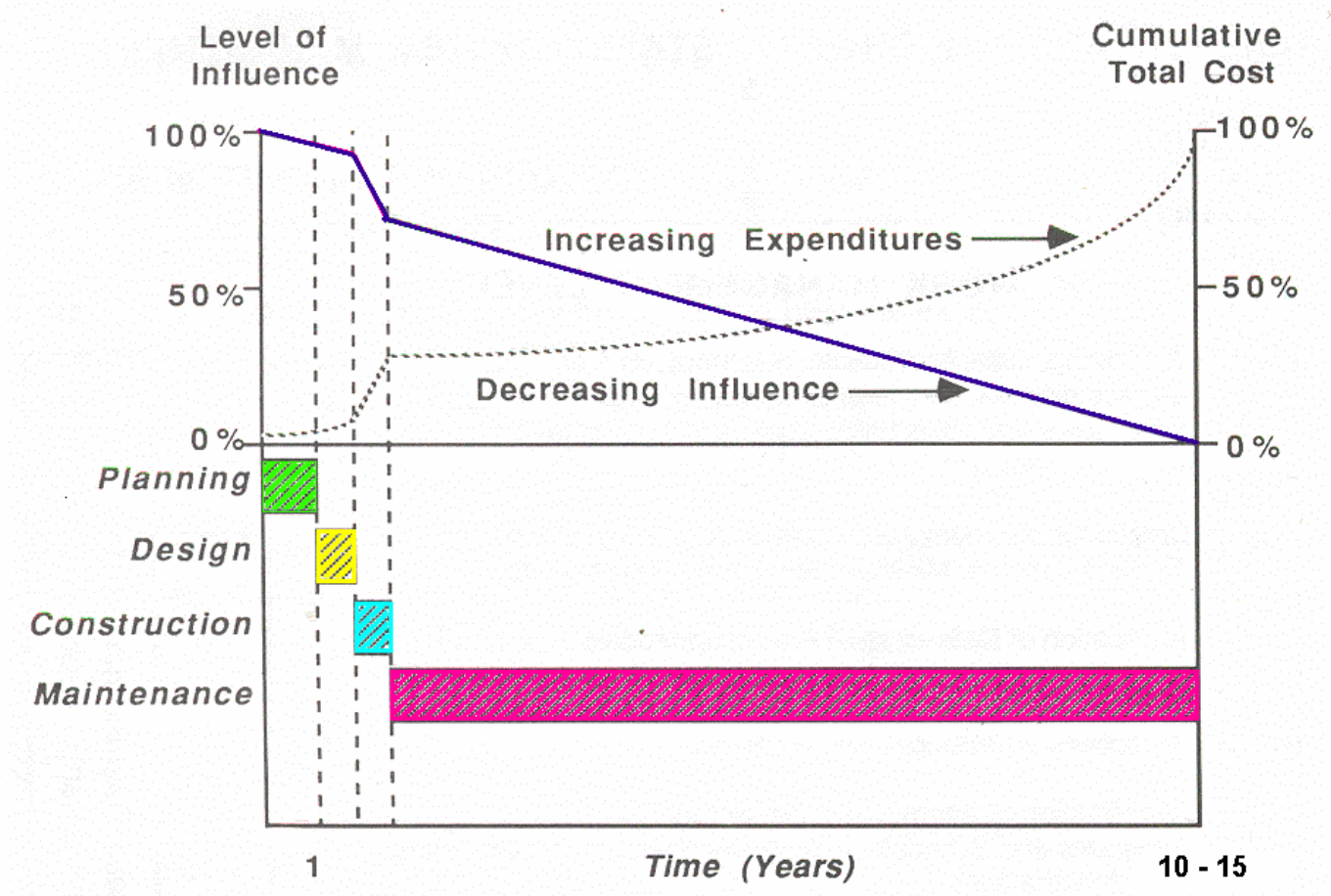
Introduction

Aims of the Guideline

- Increased delivery of all-weather access through more appropriate approaches to planning, design, construction and maintenance of LVRs
- Development of Guideline (initiated by SATCC; supported by DFID, NORAD, SIDA)
  - *High level of local participation in compilation of guideline*
  - *SADC member state representation in each of the 19 technical, national and review workshops*
  - *Much higher level of awareness and buy-in than in previous documents of this type.*

Regional Setting

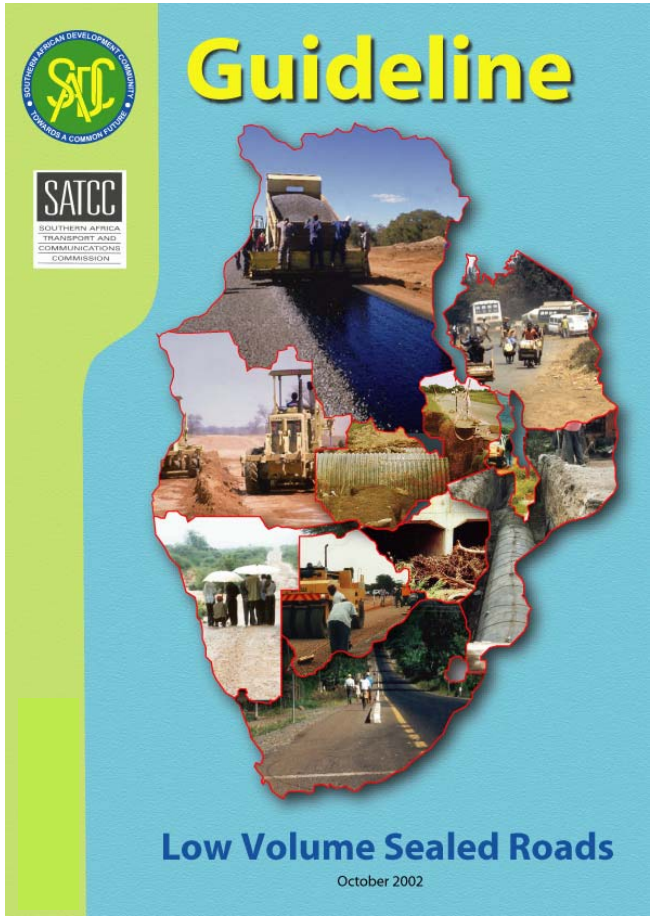
Main components of LVSR provision



Influence level of LVSR components on total cost

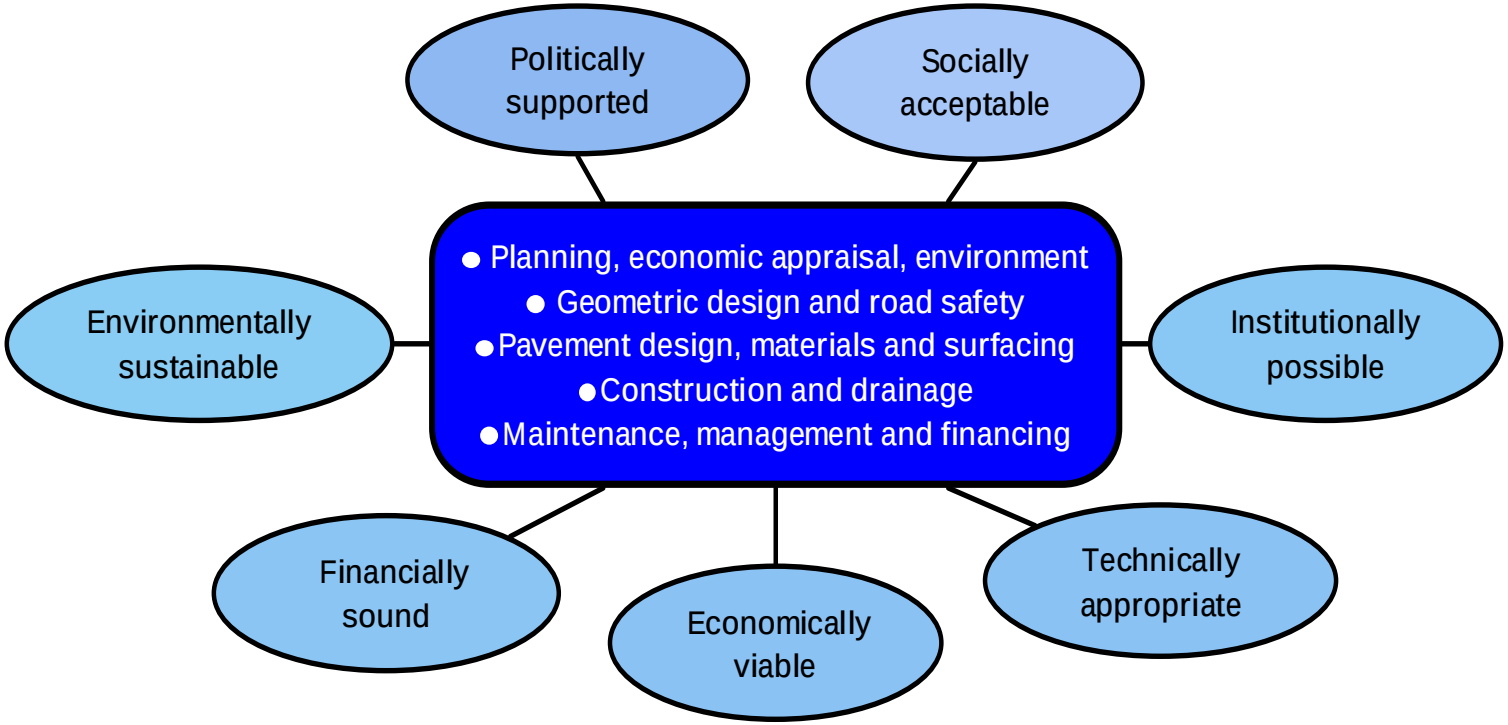
Introduction
Meeting New Challenges–the SADC LVSR Guideline

- Captures best regional and international practice
- Not prescriptive or country specific
- Departure from traditional practice w.r.t:
  - *planning, appraisal and environment*
  - *geometric design and road safety*
  - *pavement design and materials*
  - *construction and drainage*
  - *maintenance and management*
- Holistic approach satisfying *seven dimensions of sustainability* (*political, social, institutional, technical, economic, financial, environmental*)



Introduction

What's New?



Meeting the seven dimensions of sustainability

Introduction

What's new?

- Adoption of a *holistic* approach to rural road provision for the urban and rural poor (dimensions of sustainability)
- Application of *appropriate* planning tools (e.g. IRAP)
- A *whole-life* approach to investment appraisal
- Recognition of the *environmental* impacts of road provision
- The use of appraisal techniques that include *social and non-motorised* user benefits (e.g. RED)
- Application of geometric and structural designs based on *local* users, *local* knowledge and technology exchange

Introduction

What's new?

- Recognition of the disproportionate impact of road accidents on the poor and the need for safe designs that protect vulnerable road users
- Application of locally-derived standards and specifications
- Application of construction methods that increase the use of local materials and human resources thus reducing costs and increasing employment opportunities (compaction, LBM)
- Promotion of funding sources and maintenance planning and management techniques that ensure sustainable access

Introduction

Why low volume sealed roads?

Unpaved roads: dusty, health hazard, pedestrian/vehicle safety; crop, natural habitat and vehicle damage. Is this sustainable? NO!

Unpaved roads: Require continuous use of a non-renewable resource – gravel. This is inherently unsustainable and environmentally damaging. Is this sustainable? NO!

Approx. 175 million cu.m “consumed” annually in SADC region for gravelling purposes

Introduction

Limitations of Gravel Roads

Traditionally Gravel is used for rural access roads.

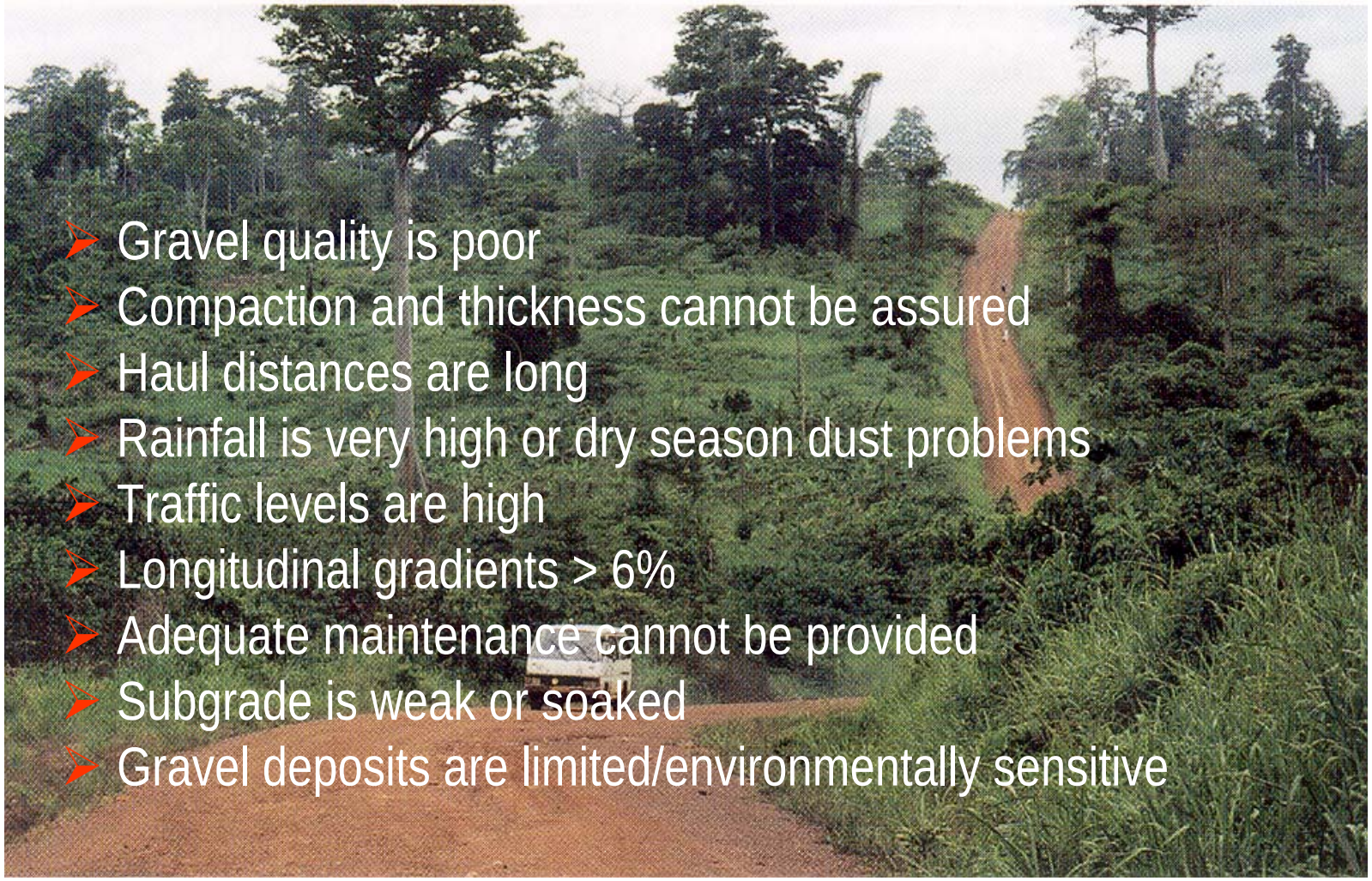
However:

- They are low (initial) cost and relatively easy to construct
- However, they are expensive to maintain – typically US$1,600/year
- Each Km of gravel road typically looses more than 70 cubic metres of material EACH YEAR
- A range of constraints means that maintenance is rarely carried out, leading to impassability, or the need to repeatedly reconstruct.

……SENSIBLE??? NO!!!

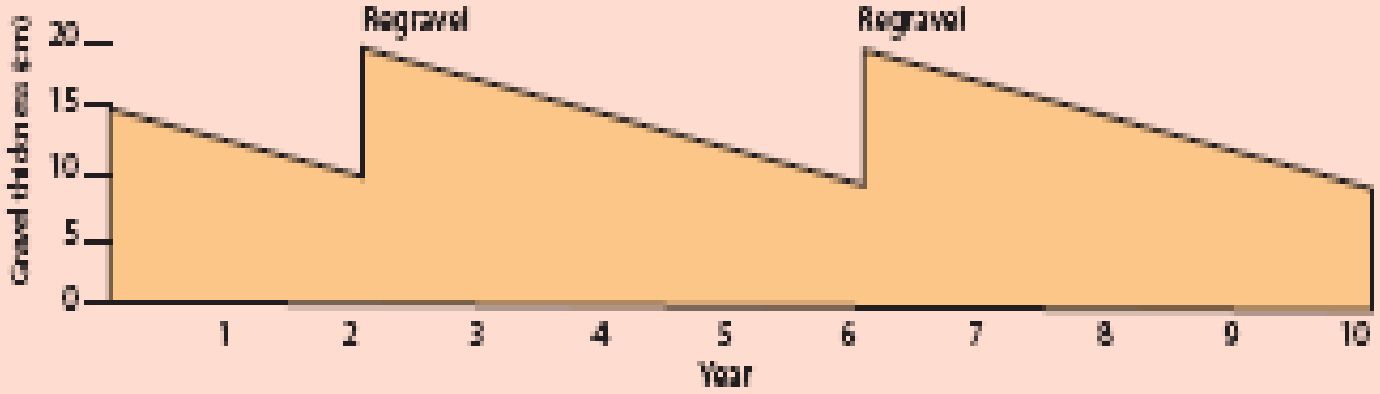
Introduction

Gravel Maintenance Challenge – Viable?

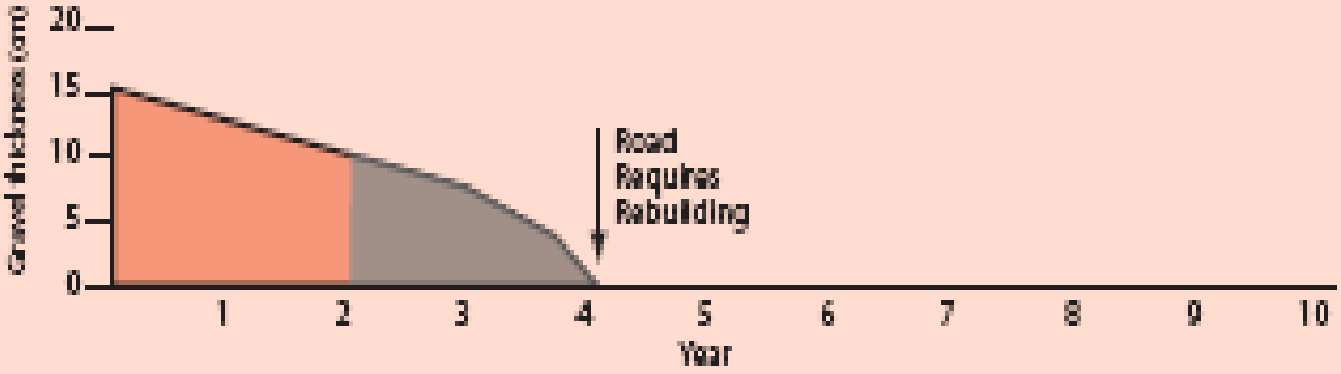


Introduction

Gravel Maintenance Challenge



(a) Gravel thickness with preventative maintenance (timely regravelling).



(b) Gravel thickness without preventative maintenance (no timely re-gravelling).

Introduction

Lack of gravel maintenance

Introduction

The Message

- There is an ‘unhealthy’ and unsustainable reliance on gravel roads to solve the all-weather access problems of many countries
- Window of opportunity for using gravel is slowly closing. Need for alternative, more sustainable solutions
- A new approach is required, using a ‘menu’ of more durable, low cost, local-resource-based surfaces, using gravel only where appropriate.
- These techniques are ideal for use by SMEs.

Introduction

The Message (Cont'd)

Poverty is linked to Poor Access

- Rural Economic and Social development needs commercial, educational, health and infrastructure initiatives that rely on GOOD PERMANENT ACCESS.

- Unfortunately, poor access for millions in rural communities limits the effectiveness of these initiatives, because of:
  - unreliable travel or impassability, especially in the rains,
  - high unit transport costs for goods, services & people.

- *Investment is discouraged by poor access.*

Introduction

Why Invest in Low-volume Sealed Roads?

- Provide more sustainable, cost-effective (LCC) solutions in terms of all weather passability
- Reduce depletion of scarce, natural resources;
- Reduce health problems;
- Reduce institutional capacity requirements;
- Reduce plant requirements;
- Reduce accident problems;
- Satisfy wishes of of road users

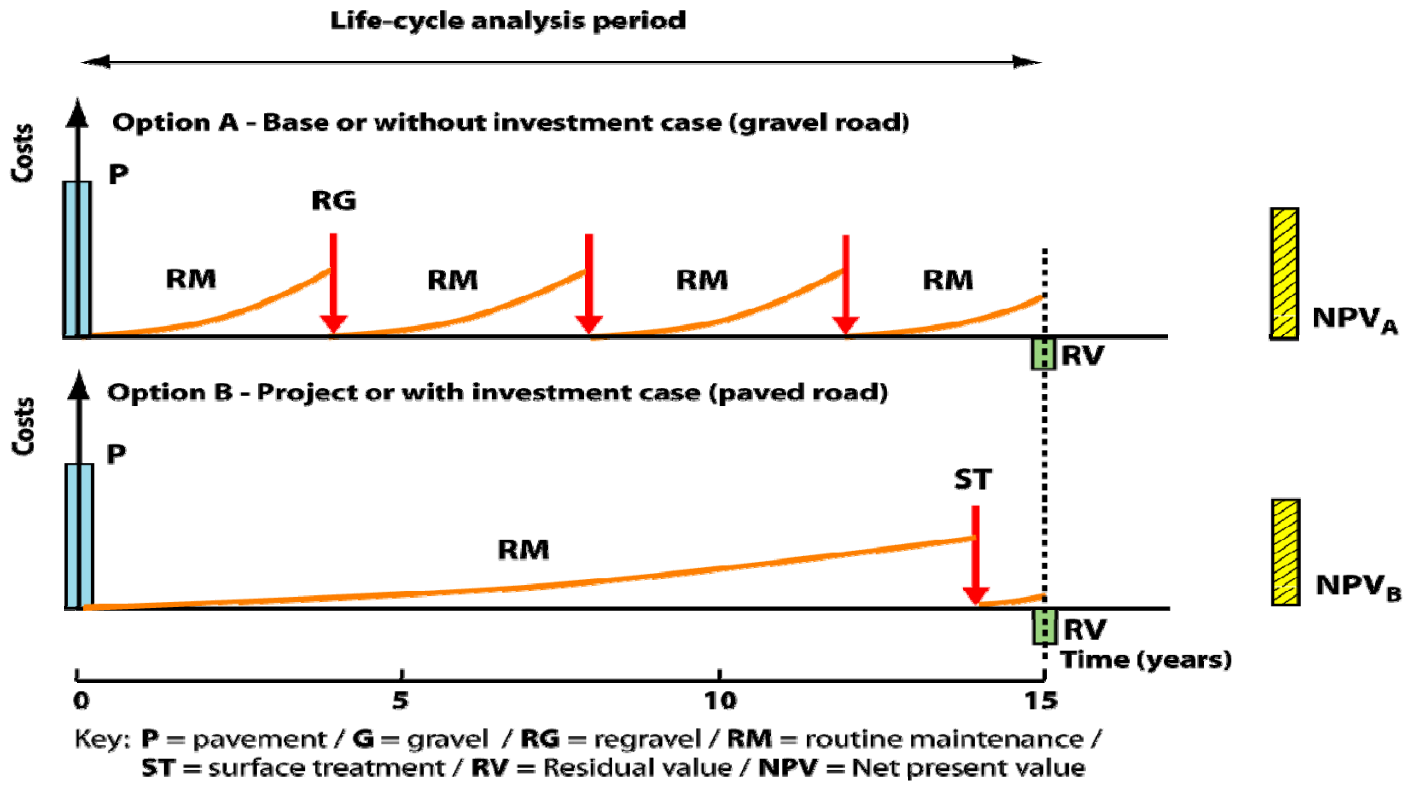
Introduction

Gravel Road Challenge

- Not possible to upgrade all unsealed roads
- However, many thousands of km of rural access roads carrying light traffic that could be justifiably upgraded using “low-cost” seals coupled with an appropriate “spot improvement” strategy
- Guideline provides guidance on achieving this objective

Introduction

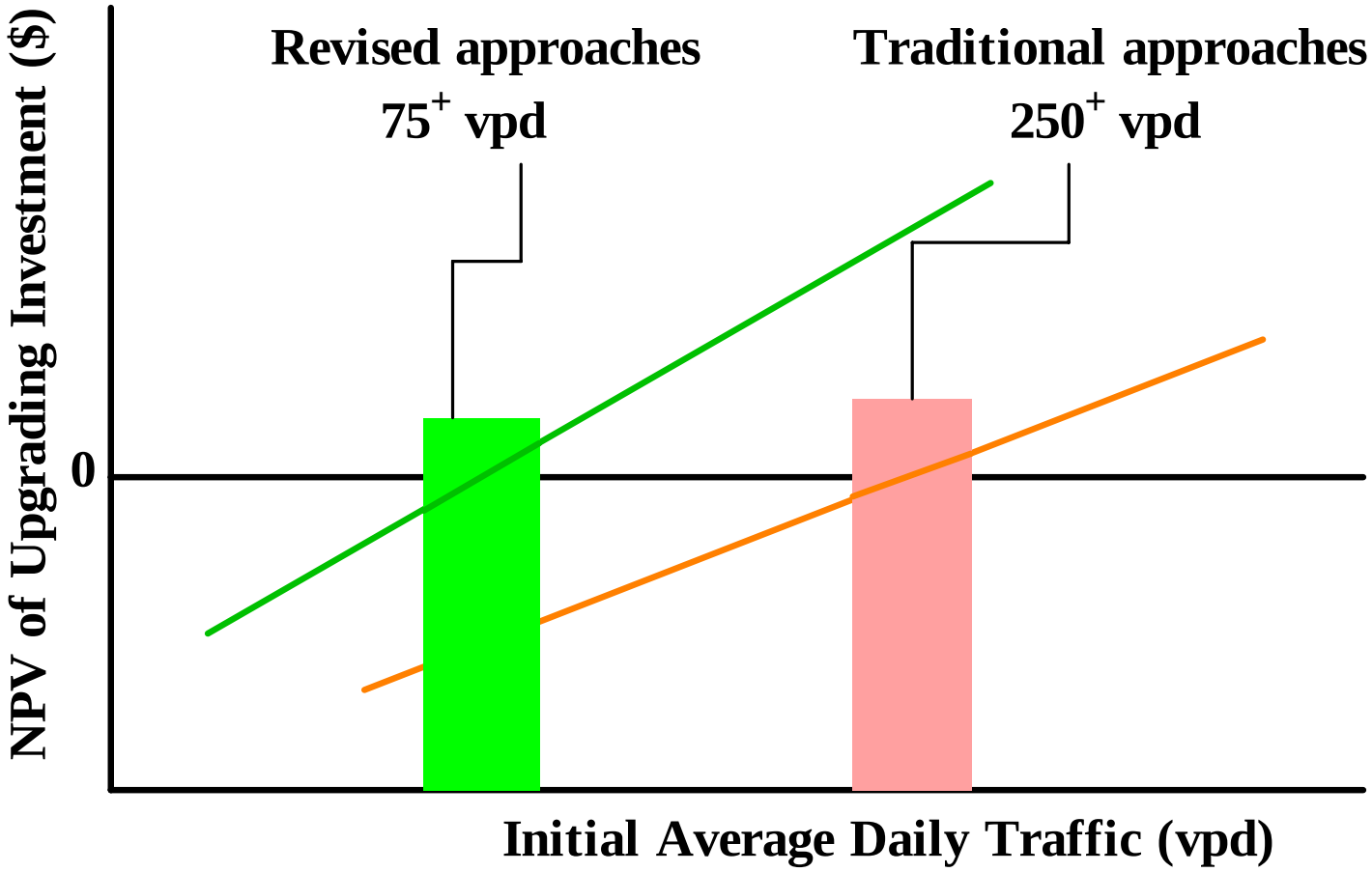
Gravel versus sealed roads: Life cycle analysis



Key: **P** = pavement / **G** = gravel / **RG** = regravel / **RM** = routine maintenance / **ST** = surface treatment / **RV** = Residual value / **NPV** = Net present value

Planning, appraisal and environment

Life cycle cost analysis



Break-even traffic: Traditional vs revised approaches

Background

Benefits from the guideline

- Implementation of the results of research
- Application of locally derived (appropriate) technology
- Better appraisal techniques for road projects with low traffic
- Improved use of local resources
- Appropriate designs/construction techniques for local conditions
- Better opportunities for technology transfer
- Cost-effective provision of low-volume surfaced roads

Introduction

Benefits of adopting new approaches

- Application of locally derived, appropriate technology
- Reduced life cycle costs of LVSR provision
- Facilitating socio-economic growth and development and poverty alleviation

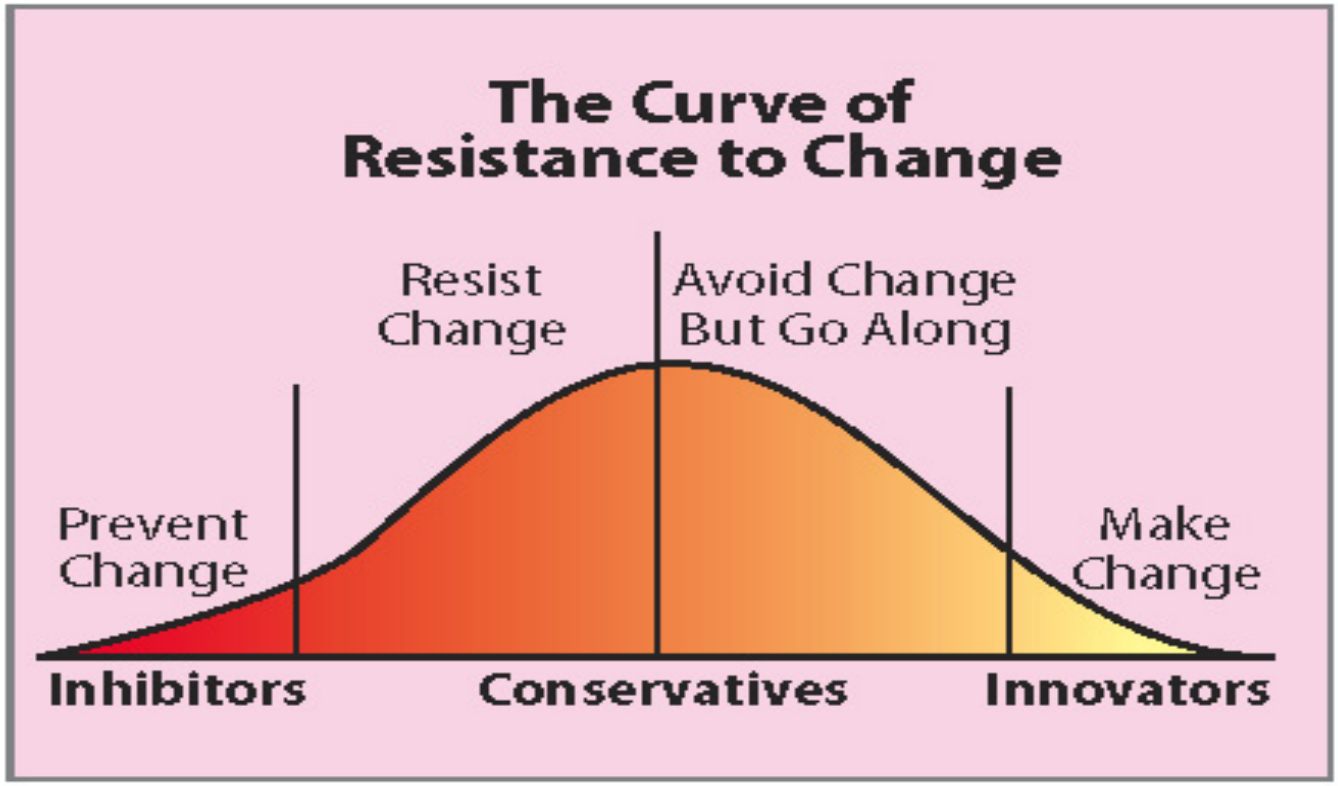
The successful engineering of a low volume sealed road requires ingenuity, imagination and innovation. It entails "working with nature" and using locally available, non-standard materials and other resources in an optimal and environmentally sustainable manner.

It will rely on planning, design, construction and maintenance techniques that maximize the involvement of local communities and contractors.

When properly engineered to an appropriate standard, a LVSR will reduce transport costs and facilitate socio-economic growth and development and reduce poverty in the SADC region.

Introduction

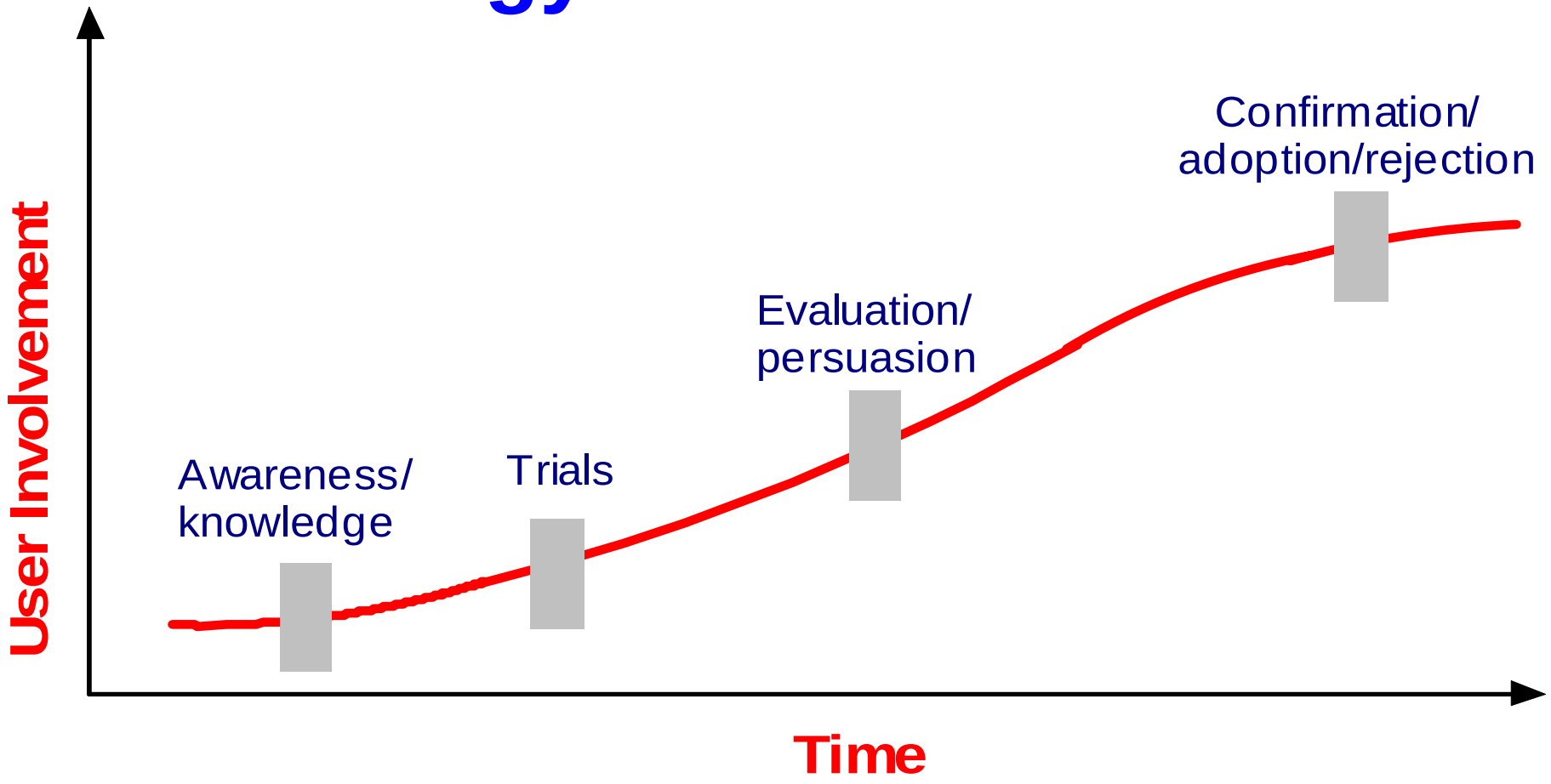
The Resistence to Change



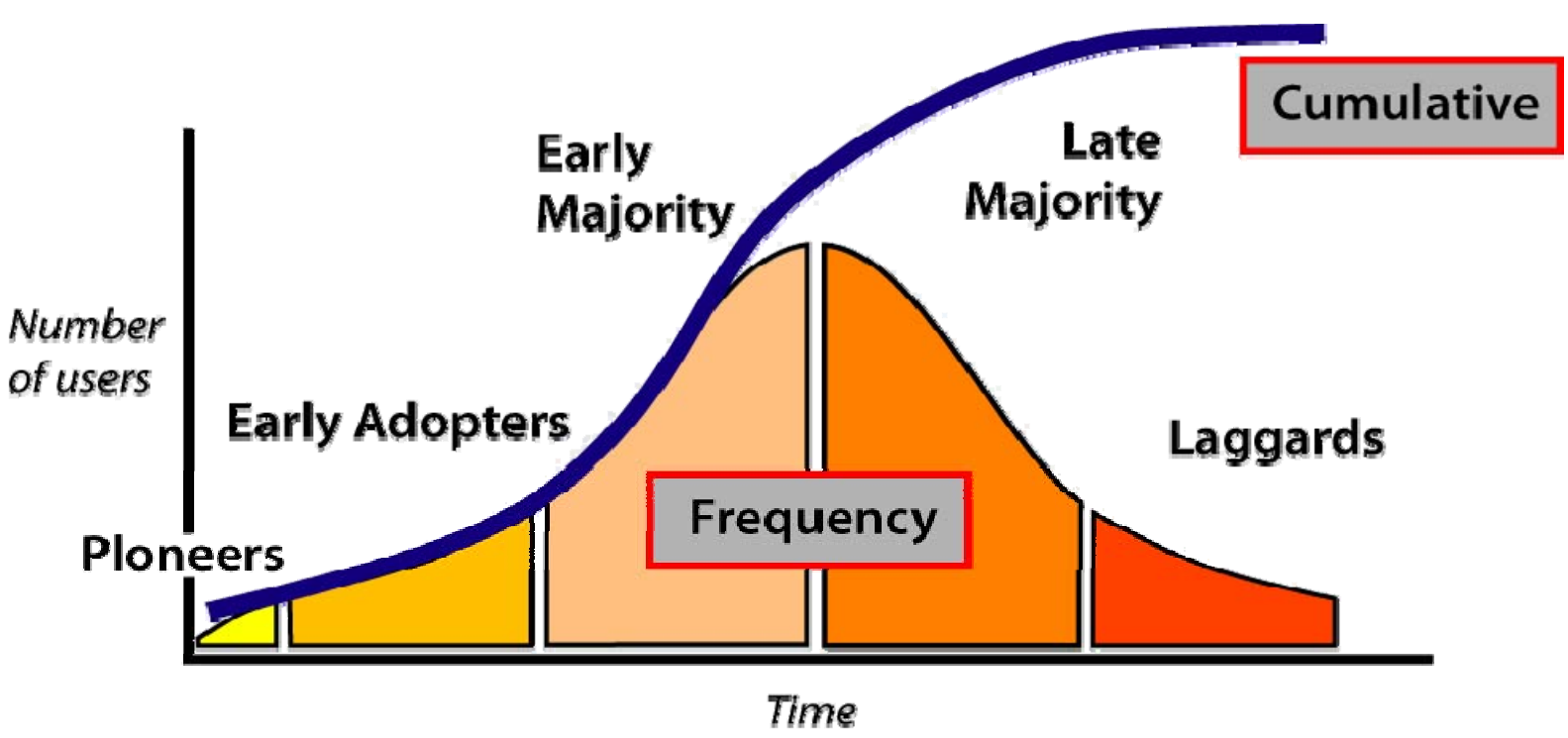
There is nothing more difficult to take in hand, more perilous to conduct or more uncertain in its success, than to take the introduction of a new order of things, because the innovator makes enemies of all those who prospered under the old order, and only lukewarm support from those who would prosper under the new. **Machievelli, *The Prince (1513)***

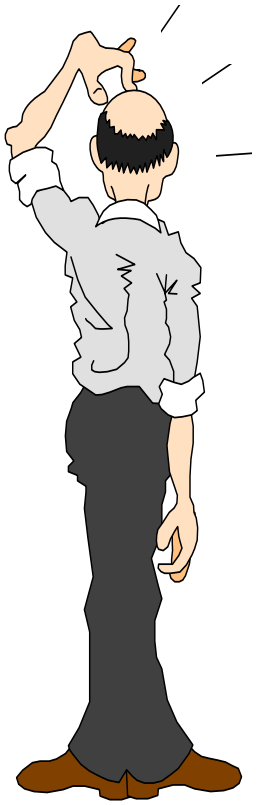
Vision to Practice

Technology Transfer Process



LVSRs – Quo Vadis?



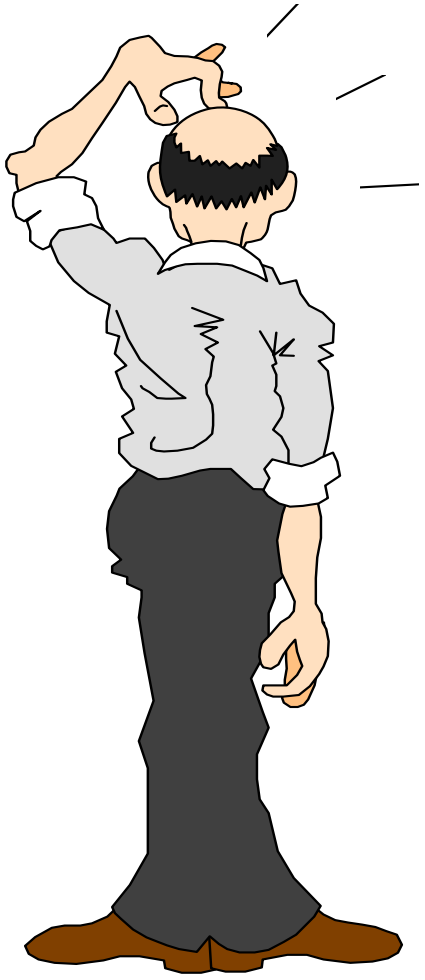


Research shows that when 20 – 25% of a target population has adopted an innovation, the whole process becomes self-sustaining.

Summary – the Future

- Need to seal many more roads to
  - Provide better accessibility
  - Reduce road user costs
  - Avoid excessive environmental damage
- Can't afford to use existing, inappropriate standards
- Need to look at innovations
- Need for carefully monitored trial sections
- Must not be scared to try new things – can manage risk!!

Are you ready to be the champions of change???



Thank you